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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/978,096	10/17/2001	William J. Ooms	214975US99	4381

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EXAMINER	
NGUYEN, CUONG QUANG	
ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 05/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/978,096	OOMS ET AL.	
	Examiner	Art Unit	
	Cuong Q Nguyen	2811	

-- The MAILING DATE of this communication appears on th cover sh et with the correspond nc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,16,17,19-37,39-49 and 51-53* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7, 16-17, 19-37, 39-49, 51-53* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-7, 16-17, 19-37, 39-49, and 51-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onga et al. (US 5,514,904) in view of Cornett et al. (US 5,173,835).

Regarding claims 1-7, 16, 17, 26, 27, 28, 36, 37, 39, 40, 46, 47, 53, Onga et al. discloses an integrated circuit having a varactor (a voltage variable thin film capacitor) comprising: a semiconductor substrate (204); a conductive electrode (205); and an insulating layer (201) formed between the second semiconductor layer and the electrode, wherein the insulating layer including substantially monocrystalline layer. See Onga et al.'s Fig.26C.

Onga et al. does not explicitly teach a second semiconductor includes a material having a higher resistivity than the first semiconductor layer (the semiconductor substrate).

Cornett et al. discloses an integrated circuit having a voltage variable capacitor comprising: a first semiconductor layer (12); a second semiconductor layer (14, an

epitaxial semiconductor layer) formed on the first semiconductor layer, wherein the second semiconductor layer including a material having a higher resistivity than the first semiconductor layer (col.2 lines 35-45); a conductive electrode (18); and an insulating layer (116) formed between the second semiconductor layer and the electrode. See Cornett et al.'s Fig.1.

Cornett et al. established that it is conventional to form second semiconductor including a material having a higher resistivity than the first semiconductor layer in the voltage variable capacitor structure. Therefore, it would have been obvious to one of ordinary skill in the art to form the second semiconductor (epitaxial layer) including a material having a higher resistivity than the first semiconductor layer as taught by Cornett et al. into Onga et al.'s device to serve as an area for a space-charge or depletion layer in order to make the voltage variable capacitor functioning. Cornett et al.'s col.2 lines 20-25.

Regarding claims 29-35, Onga et al. and Cornett et al. do not explicitly teach the voltage variable capacitor structure is a part of a radio circuit having a frequency dependent circuit.

It is conventional and also taught by Cornett et al. that the voltage variable capacitor is commonly formed in high frequency application such as a radio circuit. Cornett et al.'s col.4 lines 24-30.

It would have been obvious to one of ordinary skill in the art to incorporate the voltage variable capacitor into a radio circuit as taught by Cornett et al. in order to tune the center frequency of the radio circuit. Cornett et al.'s col.1 lines 30-40.

Regarding claims 20, 21, 41, 48, Onga et al. teaches that the monocrystalline insulating layer can be formed of metal oxide such as strontium titanate (SrTiO3). Col.18 lines 57-64.

Regarding claims 22, 42, 49, Onga et al. teaches that the insulating layer is substantially lattice matched to the semiconductor substrate. Col.8 lines 46-65.

Regarding claims 24, 44, 51, Onga et al. teaches that an interface layer formed between the insulating layer and the semiconductor substrate. Col.18 lines 65-67.

Regarding claims 25, 45, 52, an lower portion of layer (201) is considered as an interface layer and an upper portion of layer (201) is considered as the monocrystalline insulating layer.

Regarding claims 47-49 and 51-53, Onga et al. further teaches that the structure of insulating layer is rotated with respect to the structure of the semiconductor layer. However, Onga et al. does not explicitly teach that the structure of insulating layer is rotated approximately 45 degrees with respect to the structure of the semiconductor layer.

It would have been obvious to one of ordinary skill in the art to rotate the structure of insulating layer approximately 45 degrees with respect to the structure of the

semiconductor layer as claimed because the rotated angle is an art recognized variable of importance which is subject to routine experimentation and optimization.

The limitations "formed epitaxially" in claim 7, 28, 46, 53 is taken to be a product by process limitation, it is the patentability of the claimed product and not of recited process steps which must be established. Therefore, when the prior art discloses a product which reasonably appears to be identical with or only slightly different than the product claimed in a product-by process claim, a rejection based on sections 102 or 103 is fair. A product by process claim directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See In re Fessman, 180 USPQ 324,326(CCPA 1974); In re Marosi et al., 218 USPQ 289,292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964,966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product "gleaned" from the process steps, which must be determined in a "product by process " claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claim in "product by process" claim or not.

Response to Arguments

2. Applicant's arguments with respect to claims 1-7, 16-17, 19-37, 39-49, and 51-53 have been considered but are not persuasive.

Applicants argue that there is no motivation to combine the teaching of Cornett et al. into Onga et al. In response, as above discussed one of ordinary skill in the art to form the second semiconductor (epitaxial layer) including a material having a higher resistivity than the first semiconductor layer as taught by Cornett et al. into Onga et al.'s device to serve as an area for a space-charge or depletion layer in order to make the voltage variable capacitor functioning (Cornett et al.'s col.2 lines 20-25).

Applicants argue that non of reference teaches that the structure of insulating layer is rotated with respect to the structure of the semiconductor layer. In response, the rotated angle is an art recognized variable of importance which is subject to routine experimentation and optimization. So, it would have been obvious to one of ordinary skill in the art to rotate the structure of insulating layer approximately 45 degrees with respect to the structure of the semiconductor layer as claimed.

Conclusion

3. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

4. Papers related to this application may be submitted to Technology center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC 2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Group 2811 Fax Center number is (703) 308-7722 and 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.

5. Any inquiry concerning this communication or any earlier communication from the Examiner should be directed to CUONG Q NGUYEN whose telephone number is (703) 308-1293. The Examiner is in the Office generally between the hours of 6:30 AM to 5:00 PM (Eastern Standard Time) Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor TOM THOMAS who can be reached on (703) 308-2772. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7722 or 308-7724.

Any inquiry of a general nature or relating to the status of this application should be directed to the Technology Center Receptionists whose telephone number is 308-0956.

Cuong Nguyen

Primary examiner

May 14, 2003